Unit Outline

PEEN4006 Petroleum Geomechanics

Semester 1, 2015

Unit study package code:	PEEN4006
Mode of study:	Internal
Tuition pattern summary:	Note: For any specific variations to this tuition pattern and for precise information refer to the Learning Activities section. Lecture: 1 x 2 Hours Weekly Tutorial: 1 x 2 Hours Weekly This unit does not have a fieldwork component.
Credit Value:	25.0
Pre-requisite units:	Nil
Co-requisite units:	Nil
Anti-requisite units:	Nil
Result type:	Grade/Mark
Approved incidental fees:	Information about approved incidental fees can be obtained from our website. Visit fees.curtin.edu.au/incidental_fees.cfm for details.

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Acknowledgement of Country

We respectfully acknowledge the Indigenous Elders, custodians, their descendants and kin of this land past and present.

Syllabus

This unit provides a background to rock mechanics principles and how they can be used for petroleum engineering applications like: wellbore stability, hydraulic fracturing, sand production, reservoir compaction and casing collapse.

Introduction

This unit provides a background to rock mechanics principles and some of its applications in Petroleum engineering.

Unit Learning Outcomes

All graduates of Curtin University achieve a set of nine graduate attributes during their course of study. These tell an employer that, through your studies, you have acquired discipline knowledge and a range of other skills and attributes which employers say would be useful in a professional setting. Each unit in your course addresses the graduate attributes through a clearly identified set of learning outcomes. They form a vital part in the process referred to as assurance of learning. The learning outcomes tell you what you are expected to know, understand or be able to do in order to be successful in this unit. Each assessment for this unit is carefully designed to test your achievement of one or more of the unit learning outcomes. On successfully completing all of the assessments you will have achieved all of these learning outcomes.

Your course has been designed so that on graduating we can say you will have achieved all of Curtin's Graduate Attributes through the assurance of learning process in each unit.

	On successful completion of this unit students can:	Graduate Attributes addressed
1	Describe fundamental theories of geomechanics and apply them to globally variable borehole conditions	
2	Illustrate principles and applications of geomechanics in some of the key areas of petroleum engineering such as drilling, production and reservoir engineering	
3	Explain different rock mechanics lab experiments and how to obtain and interpret lab data to obtain rock properties	
4	Differentiate between in-situ and induced stresses and explain the stress changes due to an engineering construction	
5	Explain the hydraulic fracturing process and the type of failures expected to be observed due to drilling a wellbore and determine a proper mud windows to mitigate them	

Curtin's Graduate Attributes

	Apply discipline knowledge		Thinking skills (use analytical skills to solve problems)		Information skills (confidence to investigate new ideas)
	Communication skills		Technology skills		Learning how to learn (apply principles learnt to new situations) (confidence to tackle unfamiliar problems)
	International perspective (value the perspectives of others)		Cultural understanding (value the perspectives of others)		Professional Skills (work independently and as a team) (plan own work)
Find out more about Curtin's Graduate attributes at the Office of Teaching & Learning website: ctl.curtin.edu.au					

Learning Activities

Students will be given worked problems and solutions to learn some fundamental aspects of rock mechanics and some of its applications in the oil and gas industry. Also, a group project will be given to learn the process of building a simple rock mechanical model.

Learning Resources

Recommended texts

You do not have to purchase the following textbooks but you may like to refer to them.

- Engineering rock mechanics. part 2: illustrative worked examples, John P. Harrison, John A. Hudson, Elsevier, 2000
- Petroleum Related Rock Mechanics, Erling Fjar, R.M. Holt, A.M. Raaen, R. Risnes, P. Horsrud, Elsevier, 2008
- Engineering rock mechanics. Part 1: an introduction to the principles
  John A. Hudson, John P. Harrison, Elsevier, 1997

Other resources

Lecture notes will be provide through the Blackboard prior to each lecture.

Assessment

Assessment schedule

	Task	Value %	Date Due	Unit Learning Outcome(s) Assessed
1	Assignment	20 percent	**Week:** 12 **Day:** TBA **Time:** TBA	3,4,5
2	Mid semester test	30 percent	**Week:** 9 **Day:** TBA **Time:** TBA	1,2,3
3	Final examination	50 percent	TBA	4,5

Detailed information on assessment tasks

1. Students will present the results of their Case study. Each student must present part of the project for individual assessment. The mark will be given based on below criteria:

Scoring Basis	Weights
Overview: introduction, case or problem definition, background described, objective described	**10**
Contents: appropriate and insightful, logical, consistent organization	**10**
Coverage: thorough and balanced in treatment of topic**,** balanced layout, legible font, images	**15**
Presentation: explains reasoning and provides evidence, strong argument and apply own thought that reflects strong understanding of the subjects matter	**30**
Discussion: facilitate discussion and receptive to feedback	**10**
Answer to the questions	**15**
Timing	**10**
Total	**100**

2. Mid-semester test is combination of conceptual questions and problems to solve. Similar problems will be practiced through the worked problems and answers which will be provided to students through Blackboard. Students have the opportunity to ask their questions regarding the worked problems and answers during workshop sessions and receive feedback.
3. Final Examination is combination of conceptual questions and problems to solve. It is centrally organised by University. Similar problems will be practiced through the worked problems and answers which will be provided to students through Blackboard. Students have the opportunity to ask their questions regarding the worked problems and answers during workshop sessions and receive feedback.

Pass requirements

Achieve an overall grade/mark greater than or equal to 5/50.
Achieve an examination mark of at least 50%.

Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that student work is evaluated consistently by assessors. Minimum standards for the moderation of assessment are described in the Assessment and Student Progression Manual, available from policies.curtin.edu.au/policies/teachingandlearning.cfm

Late assessment policy

This ensures that the requirements for submission of assignments and other work to be assessed are fair, transparent, equitable, and

that penalties are consistently applied.

1. All assessments students are required to submit will have a due date and time specified on this Unit Outline.
2. Late submission of assessments is not accepted in this unit. Students will receive a zero mark for any assessment item submitted late.

Assessment extension

A student unable to complete an assessment task by/on the original published date/time (eg examinations, tests) or due date/time (eg assignments) must apply for an assessment extension using the Assessment Extension form (available from the Forms page at students.curtin.edu.au/administration/) as prescribed by the Academic Registrar. It is the responsibility of the student to demonstrate and provide evidence for exceptional circumstances beyond the student's control that prevent them from completing/submitting the assessment task.

The student will be expected to lodge the form and supporting documentation with the unit coordinator before the assessment date/time or due date/time. An application may be accepted up to five working days after the date or due date of the assessment task where the student is able to provide an acceptable explanation as to why he or she was not able to submit the application prior to the assessment date. An application for an assessment extension will not be accepted after the date of the Board of Examiners' meeting.

Deferred assessments

If your results show that you have been granted a deferred assessment you should immediately check your OASIS email for details.

Deferred examinations/tests will be held from 22/07/2015 to 24/07/2015 . Notification to students will be made after the Board of Examiners' meeting via the Official Communications Channel (OCC) in OASIS.

Supplementary assessments

Supplementary assessments, if granted by the Board of Examiners, will have a due date or be held between 22/07/2015 and 24/07/2015 . Notification to students will be made after the Board of Examiners' meeting via the Official Communications Channel (OCC) in OASIS.

It is the responsibility of students to be available to complete the requirements of a supplementary assessment. If your results show that you have been granted a supplementary assessment you should immediately check your OASIS email for details.

Referencing style

The referencing style for this unit is Chicago.

More information can be found on this style from the Library web site: library.curtin.edu.au.

Academic Integrity (including plagiarism and cheating)

Any conduct by a student that is dishonest or unfair in connection with any academic work is considered to be academic misconduct. Plagiarism and cheating are serious offences that will be investigated and may result in penalties such as reduced or zero grades, annulled units or even termination from the course.

Plagiarism occurs when work or property of another person is presented as one's own, without appropriate acknowledgement or referencing. Submitting work which has been produced by someone else (e.g. allowing or contracting another person to do the work for which you claim authorship) is also plagiarism. Submitted work is subjected to a plagiarism detection process, which may include the use of text matching systems or interviews with students to determine authorship.

Cheating includes (but is not limited to) asking or paying someone to complete an assessment task for you or any use of unauthorised materials or assistance during an examination or test.

For more information, including student guidelines for avoiding plagiarism, refer to the Academic Integrity tab in Blackboard or academicintegrity.curtin.edu.au.

Additional information

Enrolment

It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.

Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- the University's Guiding Ethical Principles
- the University's policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University's policies on appropriate use of software and computer facilities

Information on all these things is available through the University's "Student Rights and Responsibilities website at: students.curtin.edu.au/rights.

Student Equity

There are a number of factors that might disadvantage some students from participating in their studies or assessments to the best of their ability, under standard conditions. These factors may include a disability or medical condition (e.g. mental illness, chronic illness, physical or sensory disability, learning disability), significant family responsibilities, pregnancy, religious practices, living in a remote location or another reason. If you believe you may be unfairly disadvantaged on these or other grounds please contact Student Equity at eesj@curtin.edu.au or go to http://eesj.curtin.edu.au/student_equity/index.cfm for more information

You can also contact Counselling and Disability services: http://www.disability.curtin.edu.au or the Multi-faith services: http://life.curtin.edu.au/health-and-wellbeing/about_multifaith_services.htm for further information.

It is important to note that the staff of the university may not be able to meet your needs if they are not informed of your individual circumstances so please get in touch with the appropriate service if you require assistance. For general wellbeing concerns or advice please contact Curtin's Student Wellbeing Advisory Service at: http://life.curtin.edu.au/health-and-wellbeing/student_wellbeing_service.htm

Recent unit changes

We welcome feedback as one way to keep improving this unit. Students are encouraged to provide unit feedback through ***e*VALUate**, Curtin's online student feedback system (see evaluate.curtin.edu.au/info/).

	To view previous student feedback about this unit, search for the Unit Summary Report at evaluate.curtin.edu.au/student/unit_search.cfm. See evaluate.curtin.edu.au to find out when you can ***e*VALUate** this unit.

Recent changes to this unit include:

Workshop sessions are introduced in order to demonstrate worked problems and solutions provided to students.

Case Study is introduced as part of the unit assessment to familiarise students with practical aspects of the unit.

Program calendar

Week	Begin Date	Lecture/ Seminar **(Mon)**	Pre-readings	Workshop **(Tue)**	Assessment Due
Orientation	**23 February**				
1.	**2 March**	Lecture			
2.	**9 March**	Lecture		Workshop	
3.	**16 March**	Lecture		Workshop	
4.	**23 March**	Lecture		Workshop	
5.	**30 March**	Lecture		Workshop	
6.	**6 April**	Lecture		Workshop	
7.	**13 April**	Tuition Free Week			
8.	**20 April**	Tuition Free Week			
9.	**27 April**	Mid-Semester Test			Mid-Semester Test
10.	**4 May**	Lecture		Workshop	
11.	**11 May**	Lecture		Workshop	
12.	**18 May**	Student Presentation		Workshop	Case Study
13.	**25 May**	Student Presentation		Student Presentation	
14.	**1 June**	Lab visit			
15.	**8 June**	Study Week			
16.	**15 June**	Examinations			
17	**22 June**	Examinations			